Claims

1. A system to control the expansion of a memory metal comprising:

a memory metal;

a fuel-oxidizer mixture located in the proximity of said memory metal; and

a catalyst to lower the energy barrier of said fuel-oxidizer mixture.

2. The system to control the expansion of a memory metal according to claim 1, further comprising a reaction initiator to commence a reaction of said fuel-oxidizer mixture.

3. The system to control the expansion of a memory metal according to claim 2, wherein said reaction initiator comprises a spark.

4. The system to control the expansion of a memory metal according to claim 2, wherein said reaction initiator comprises an electric current through said memory metal.

5. The system to control the expansion of a memory metal according to claim 1, wherein said memory metal comprises NITINOL.

6. The system to control the expansion of a memory metal according to claim 1, wherein said fuel-oxidizer mixture is selected from the group consisting of hydrogen-oxygen, ammonia-oxygen, hydrocarbon vapor-oxygen, and alcohol vapor-oxygen.

7. The system to control the expansion of a memory metal according to claim 1, wherein said fuel-oxidizer mixture comprises a monopropellant.

8. The system to control the expansion of a memory metal according to claim 1, wherein said catalyst is selected from the group consisting of palladium, platinum, and copper.

9. The system to control the expansion of a memory metal according to claim 1, wherein said catalyst is applied to a surface of said memory metal.

10. The system to control the expansion of a memory metal according to claim 1, wherein said fuel-oxidizer mixture is applied to a surface of said memory metal.

11. The system to control the expansion of a memory metal according to claim 1, wherein said memory metal comprises a tube.

12. The system to control the expansion of a memory metal according to claim 1, wherein said memory metal comprises a wire.

13. The system to control the expansion of a memory metal according to claim 1, wherein said memory metal comprises a plate.

14. The system to control the expansion of a memory metal according to claim 2, wherein heat from said reaction of said fuel-oxidizer mixture raises the temperature of said memory metal, causing said memory metal to expand.

15. The system to control the expansion of a memory metal according to claim 14, wherein said reaction of said fuel-oxidizer mixture occurs in a transition temperature range of said memory metal, thereby causing a maximum expansion of said memory metal.

16. The system to control the expansion of a memory metal according to claim 2, wherein said memory metal is caused to relax by cutting off the supply of said fuel-oxidizer mixture, and providing a flow of air over said memory metal.

17. The system to control the expansion of a memory metal according to claim 2, wherein said reaction of said fuel-oxidizer mixture does not generate sufficient heat to enable said reaction to be self-sustaining, and further wherein auxiliary heat is supplied to said system to sustain said reaction.

18. A process to control the expansion of a memory metal, comprising the steps of:

introducing a catalyst into the vicinity of said memory metal; and

introducing a fuel-oxidizer mixture into the vicinity of said memory metal.

19. The process to control the expansion of a memory metal according to claim 18, further comprising the step of introducing a reaction initiator to initiate an oxidation of said fuel.

20. The process to control the expansion of a memory metal according to claim 18, wherein said fuel-oxidizer mixture is selected from the group consisting of hydrogen-oxygen, ammonia-oxygen, hydrocarbon vapor-oxygen, and alcohol vapor-oxygen.

21. The process to control the expansion of a memory metal according to claim 18, wherein said catalyst is selected from the group consisting of palladium, platinum, and copper.

22. The process to control the expansion of a memory metal according to claim 18, wherein said catalyst is applied to a surface of said memory metal.

23. The process to control the expansion of a memory metal according to claim 18, wherein said fuel-oxidizer mixture is applied to a surface of said memory metal.

24. The process to control the expansion of a memory metal according to claim 18, wherein said reaction of said fuel-oxidizer mixture occurs in a transition temperature

range of said memory metal, thereby causing a maximum expansion of said memory metal.

25. The process to control the expansion of a memory metal according to claim 18, further comprising the step of relaxing said memory metal by cutting off the supply of said fuel-oxidizer mixture and providing a flow of air over said memory metal.

26. A memory metal comprising:

a catalyst applied onto a surface of said memory metal; and

a fuel-oxidizer mixture applied onto said surface of said memory metal.

27. The memory metal according to claim 26, further comprising:

a reaction initiator to initiate a reaction between said fuel and said oxidizer.

28. The memory metal according to claim 26, wherein said memory metal comprises NITINOL.

29. The memory metal according to claim 26, wherein said fuel-oxidizer mixture is selected from the group consisting of hydrogen-oxygen, ammonia-oxygen, hydrocarbon vapor-oxygen, and alcohol vapor-oxygen.

30. The memory metal according to claim 26, wherein said catalyst is selected from the group consisting of palladium, platinum, and copper.

31. The memory metal according to claim 26, wherein said memory metal comprises a tube.

32. The memory metal according to claim 26, wherein said memory metal comprises a wire.

33. The memory metal according to claim 26, wherein said memory metal comprises a plate.